

AMPHIBIA: ANURA: HYLIDAE

HYLA ALBOPUNCTATA

Catalogue of American Amphibians and Reptiles.

de Sá, R.O. 1995. *Hyla albopunctata*.

Hyla albopunctata Spix, 1824

Hyla boans (not of Linnaeus, 1758): Latreille, 1801:184.

Hyla albopunctata Spix, 1824: 33, pl. 6, fig 5. Type-locality: unknown; neotype from Belo Horizonte, Minas Gerais, Brasil (Duellman, 1971). Holotype, formerly in the Zoologische Staatssammlung, München (ZSM), now lost; University of Kansas Museum of Natural History (KU) 100000, adult male, collected 9 February 1965 by W.C.A. Boker-mann and A.B. Machado, was designated the neotype by Duellman (1971) (examined by author).

Auletris boans: Wagler, 1830:201.

Hypsiboas boans: Tschudi, 183:72.

Hyla oxyrhina Reinhardt and Lütken, 1862:189. Type-locality: "Minas og Lagoa Santa," type-locality (*fide* Duellman, 1976 [1977]:27), Lagoa Santa, Minas Gerais, Brasil. Syn-types, British Museum, Natural History (BMNH) 1936.12.3.144, NHMW (1 specimen, no number), Natur-Museum Senckenberg (SMF) 4772 (2 specimens), ZMUC 1433-35, all adults, sexes unknown, collected by J. Reinhardt, date of collection unknown (not examined by author).

Hyla spectrum Reinhardt and Lütken, 1862:195. Type-locality, not given; *fide* Duellman (1976 [1977]:27), Lagoa Santa, Minas Gerais, Brasil. Holotype, ZMUC 3432, a poorly preserved juvenile, sex unknown, collected by J. Reinhardt, date of collection unknown (not examined by author).

Hyla (Hypsiboas) oxyrhina: Cope, 1863:48.

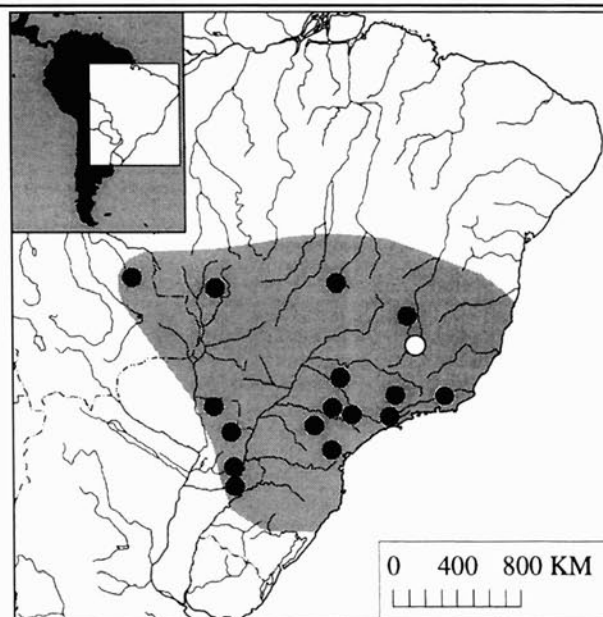
Hypsiboas albipunctatus: Cope, 1867:20. *Lapsus* (see Nomenclatural History).

Hypsiboas spectrum: Cope, 1867:200.

Hyla albopunctata albopunctata: Rivero, 1961:105.

• **Content.** No subspecies are recognized.

• **Definition.** *Hyla albopunctata* is a medium-sized species in the *albopunctata* group, adults range in size from 42-52 mm SVL (males average 47 mm and females 49 mm). The head is triangular in outline, always longer than wide. The snout is moderately long and acuminate in dorsal view, whereas in lateral view, it is acuminate and protrudes beyond the mandible to form an angle of 45 degrees over the mandible. The canthus rostralis is rounded and distinct, the loreal region is slightly concave, and the internarial region is slightly convex. The eyes are large, approximately twice the diameter of the tympanum. The tympanum is separated from the eye by a distance approximately one half the diameter of the tympanum. The upper arm is slender; the forearm is slender to slightly robust with a weakly developed dermal fold extending from the elbow to the base of the disc of the 4th finger. The fingers are moderately long, fringed, and have small, round terminal discs. The distal subarticular tubercles are large, single, oval, and subconical, whereas the proximal subarticular tubercles are more rounded and smaller. Small, subconical supernumerary tubercles are present on the proximal portions of the digits. The palmar tubercle is bifid and slightly to moderately developed. The modal webbing formula for the hand is: I—II 2*—3.5 III 3.0—2.5 IV. The hind limbs are long and slender. A weak tarsal fold extends from the heel to the base of the inner metatarsal tubercle. The inner metatarsal tubercle is large, oval, relatively flat, and visible dorsally. The proximal subarticular tubercles are much smaller than the distal ones. Small supernumerary tubercles are present on the



Map. Distribution of *Hyla albopunctata*. The type-locality is unknown, the circle indicates the locality of the neotype *fide* Duellman (1971). Dots mark other records.



Figure 1. *Hyla albopunctata* from Santa Rita do Araquaiá, Goiás, Brasil, field number JPC 7535 (photograph by Janalee P. Caldwell).

proximal segments of the toes; the tubercles are round and less distinct than those of the hand. The modal webbing formula for the foot is: I 2—2* II 1.5—2.5 III 2—3* IV 3—1* V. The tongue is lanceolate and slightly notched anteriorly.

In preservative, the coloration of the dorsal surfaces of the body and of the fore- and hindlimbs is pale brown. Transverse, darker brown stripes extend across the dorsum of the body, between the eyes, and sometimes even anterior to the eyes. However, these stripes may be fused to one another forming an extensive reticulation, or they may be broken into elongate, transverse, and relatively independent spots. A dark brown canthal stripe begins on the snout, and it continues as a postorbital stripe through the tympanum to a point above the insertion of the forelimbs. The upper and lower lips are pale brown. Dark brown bars also are present on the dorsal surfaces of the thigh and shank. A white supra-anal stripe is accentuated by a dark brown anal region. A creamy white line extends from the heel along the outer edge of the tarsus and fifth toe. Ventral to this white

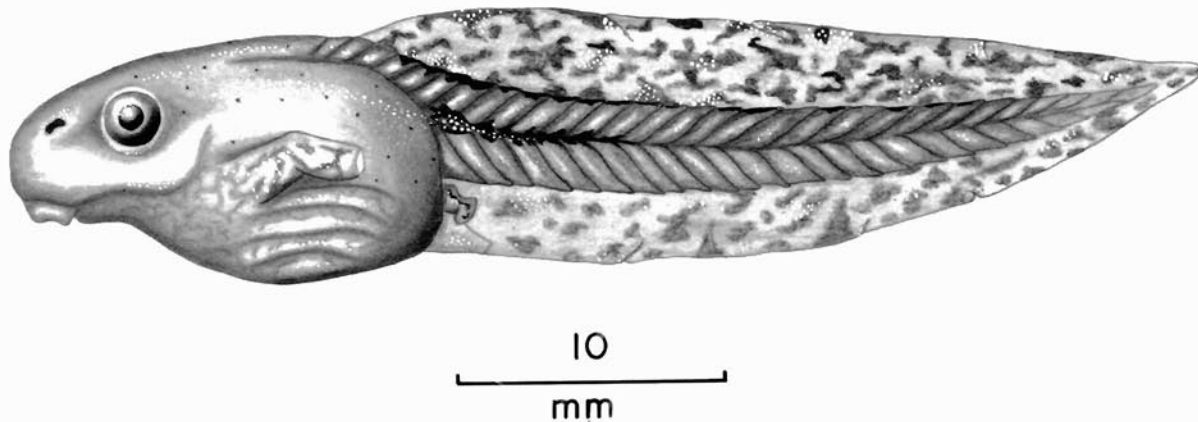


Figure 2. Tadpole of *Hyla albopunctata*, Gosner's stage 36 (KU 146854).

line, the coloration is dark brown. The posterior surface of the thighs is dark brown also, and has creamy white spots (Fig. 1) that range from well-defined (e.g., National Museum of Natural History [USNM] 127282) to a bold reticulate pattern (e.g., USNM 99138). The same pattern of color variation exists on the flanks. The ventral surfaces are uniformly cream with a brownish throat and a few brown spots in the pectoral region of some specimens.

The tadpoles of *Hyla albopunctata* have an elliptical body which is as deep as wide (Fig. 2). The snout is rounded in dorsal and lateral views. The top of the head is slightly convex. In lateral view, the ventral contour of the body is plano-convex. The nostrils are oval, depressed, and dorsal; their apertures are visible in lateral view. The nostrils have a moderately large, medial, triangular dermal flap that partially occludes the aperture. The internarial width is equal to that of the interorbital region and the oral disc. The eyes are dorsolateral and directed laterally. The spiracle is lateral, long, tubelike, and sinistral. The spiracular opening lies in the posterior third of the body, and is raised from the surface of the body. The cloacal tube is moderately long and dextral to the caudal fin, with which it is

fused. The anterior terminus of the dorsal fin is at the base of the tail. The anterior end of the ventral fin also lies at the base of the tail, but its anterior part is hidden by the cloacal tube. The dorsal fin is deeper than the ventral fin. The margin of the ventral fin is subparallel to the axis of the tail, whereas the margin of the dorsal fin is curved uniformly. The longitudinal axis of the tail is straight. The caudal musculature is slender and tapers gradually to the posterior end of the tail. At the midpoint of the tail, the depth of the caudal musculature is equal to the depth of the dorsal fin and greater than that of the ventral fin. The tip of the tail is acute. The mouth is anteroventral and directed ventrally. The mouth has a pair of large ventrolateral folds (Fig. 3). A small, medial portion of the upper lip lacks papillae; elsewhere marginal papillae are present in a single row along the border of the mouth. A few additional submarginal papillae are present in the ventrolateral folds. The upper beak is moderately deep and has blunt serrations; is laterally convex, paramedially concave, and medially convex; and is strongly pigmented. The lower beak is shallow, concave, pigmented, and uniformly serrated. Two upper and three lower rows of denticles are present. The first upper row is continuous and shorter than the second row, which is narrowly interrupted medially. The first and second lower rows are of equal length, and the first row is interrupted medially. The third lower row is continuous and the shortest of the lower rows. In preservative, the snout and dorsal surfaces of body are dark brown, whereas the sides and ventral region are pale brown. The caudal musculature is pale cream and the dorsal edge is dark brown. The dorsal and posterior halves of the ventral fin are strongly pigmented with brown spots; the anterior half is slightly pigmented and almost transparent. Small, dark brown dots are scattered over the dorsal and dorsolateral surfaces.

On the basis of a recording (KU tape 1124) made at Botúcatu, São Paulo, Brasil, at 20:30 hrs at an air temperature of 21°C, the call of *Hyla albopunctata* consists of a single note. The mean call duration is 420 ms (range, 280-681 ms). The mean dominant harmonic is 0.9 kHz (0.7-1 kHz), and energy is visible on the sonogram up to 3.0 kHz (2.3-4.0 kHz). The mean number of pulses is 39.6 (34-45) per call and the mean pulse rate is 100/s (64-125/s) (Fig. 4).

• **Diagnosis.** *Hyla albopunctata* differs from the other members of the *albopunctata* group by the following combination of characters: (1) modal webbing formula of the hand and the foot, (2) snout acuminate, clearly protruding beyond the mandible, (3) upper lip pale brown, (4) anal region dark brown with white supra-anal stripe, (5) flanks and posterior surfaces of thighs

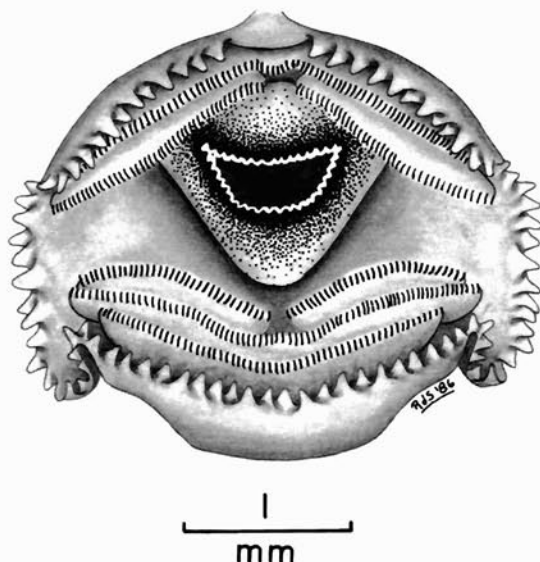


Figure 3. Oral disc of *Hyla albopunctata* tadpole, Gosner's stage 36 (KU 146854).

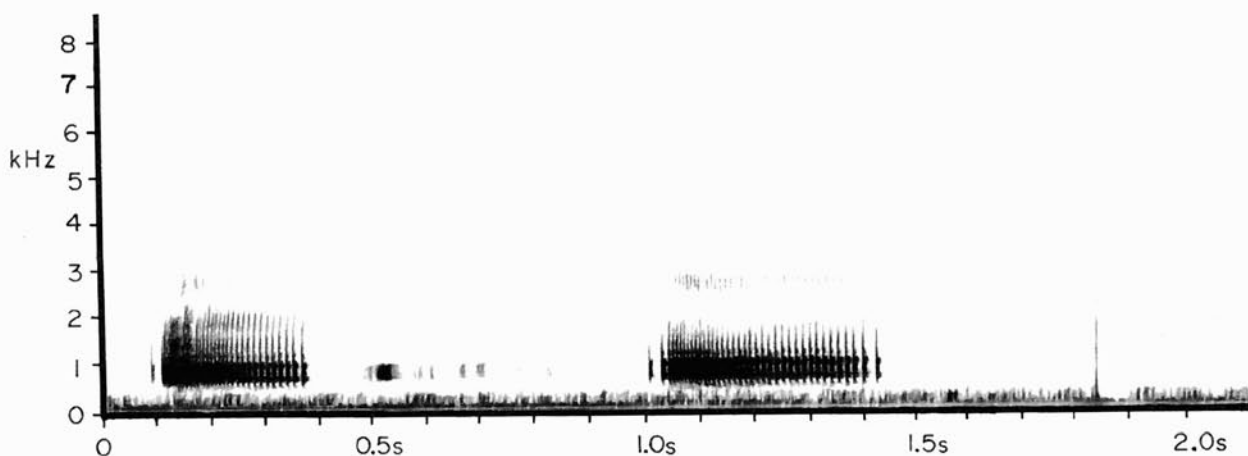


Figure 4. Audiospectrogram of *Hyla albopunctata* from Botúcatu, São Paulo, Brasil (KU tape 1124).

brown with scattered white spots, (6) ventral edge of nasal unnotched, (7) frontoparietals not articulating medially, and (8) otic plate of squamosal slightly overlapping a bony crista parotica.

• **Descriptions.** Descriptions of adult external morphology and osteology are in Cochran (1955), Cei (1980), and Heyer et al. (1990). Lutz (1973) presented descriptions of external morphology, morphological variation, secondary sex characteristics, and coloration. A tadpole in Gosner's stage 27 was described by Heyer et al. (1990).

• **Illustrations.** An illustration accompanies the original description given by Spix (1824); although the illustration is poor, the white dots on the posterior surface of the thighs that characterize the species are clearly visible. Color plates of *H. albopunctata* can be found in Lutz (1973), Cei (1980), and Heyer et al. (1990). Cei (1980) also presented illustrations of the hand, foot, and pectoral girdle. Illustrations of adults also are given by Cochran (1955). Heyer et al. (1990) provided an accurate description of coloration in life and the range of color variation for this species; also they provided an outline illustration of the tadpole.

• **Distribution.** *Hyla albopunctata* occurs primarily in southeastern Brasil. Its range extends to central Brasil, eastern Paraguay, eastern Bolivia, and northeastern portions of Argentina.

• **Fossil Record.** None.

• **Pertinent Literature.** Lutz (1973) reported the call of *H. albopunctata* to consist of "... two short, separate cracks, sometimes followed by a third one at a lower pitch." This description does not agree with the analysis presented here or with Heyer et al. (1990). Lutz's description may be of the call of another species. Heyer et al. (1990) reported two types of calls for *H. albopunctata* and one of those agrees with the one presented here. The two types of calls may suggest more complex social interactions than previously reported for this species.

Lynch (1979) suggested that *H. albopunctata* originated by vicariance in the Atlantic tropical forests of South America from a common ancestor with *H. lanciformis* and *H. multifasciata*.

Cei (1980) reported that *H. albopunctata* inhabits open spaces of the forest, calling at night from low vegetation at the edge of ponds. Heyer et al. (1990) found the species calling in November.

Additional references to this species (as *Hyla boans*) are included in Duméril and Bibron (1841), Burmeister (1856), Peracca (1904), Baumann (1912), Nieden (1923), Miranda-Ribeiro (1926), Parker (1928), Carvalho (1939), Schubart (1939), Mertens (1940), and Travassos and Freitas (1942); and (as *H. albopunctata*) in Peters (1872), Andersson (1900), Shreve (1935), Cochran (1955), Duellman (1971), and Lutz (1973).

• **Nomenclatural History.** Cope (1863:48) used a new combination *Hyla (Hypsiboas) oxyrhina*, but explicitly mentioned that his specimens are identical to those described as *Hypsiboas raniceps* Cope, 1862. However, whereas *Hyla oxyrhina* Reinhardt and Lütken, 1862, is a synonym of *Hyla albopunctata* and possesses the white spots on the flanks and thighs that characterize *albopunctata*, these white spots are not mentioned in the description of *Hypsiboas raniceps*. Shreve (1935) placed Cope's *Hypsiboas raniceps* in the synonymy of *Hyla albopunctata*; however, Cope's description of *Hypsiboas raniceps* corresponds to *Hyla raniceps*. Reinhardt and Lütken (1862) described *Hyla spectrum* based on juvenile specimens of *H. albopunctata*. Because Cope (1867) did not provide any comments or explanation for his later use of *albipunctatus*, *albipunctatus* most likely is a typographical error instead of a deliberate change. Mertens (1940) indicated that the taxon described as *Hyla albopunctata* Spix was preoccupied by the taxon described as *Hyla boans* Daudin, 1802. However, Andersson (1900) indicated that *H. albopunctata* ought to be retained for the taxon described by Spix (1824) and that the name *Hyla boans* should be replaced with *Hyla maxima* (Laurenti, 1768); that taxon was originally described by Linnaeus (1754) as *Rana lactea* and later changed by Linnaeus (1758) to *Rana boans*. Further details on the nomenclatural history of *Hyla boans* can be found in Duellman (1971). Cochran (1955) included in the synonymy of *Hyla albopunctata* specimens identified as *Hyla boans* Daudin (not *Hyla boans* of Linnaeus) by Crawford (1931), Crawford and Jones (1933), Beebe (1919, 1925), Parker (1935), and Ruthven (1919). However, those specimens are from Guyana and probably correspond to *Hyla multifasciata*. In addition, Cochran (1955) incorrectly included *H. multifasciata* Günther, 1858, in the synonymy of *albopunctata*. Günther's description and illustration (1858:101, pl. 8 Fig. D) correspond to *H. multifasciata*. However, in the appendix of the same paper (Günther 1858:146) listing additional specimens, Günther mistakenly suggested that *H. multifasciata* is a variety of *H. boans* Daud. and indicated that his illustration corresponded to that species (1858:146 under *H. boans*). Cochran also included Boulenger's (1882) description of *H. boans* Daud. in the syn-

onymy of *albopunctata*, but Boulenger's description made specific reference to distinct dark bands on the thighs and includes Surinam in the range of the species, suggesting that Boulenger was probably working with specimens of *H. albopunctata* and *H. multifasciata*.

Lescure (1976) correctly indicated that Daudin (1800, 1803a, 1803b) did not mention the white spots present in *H. albopunctata* and that Daudin's description corresponds to *H. multifasciata*.

• **Remarks.** Cochran (1955) indicated that the distribution of *albopunctata* extended farther north to include localities in French Guiana and Surinam. However, those specimens probably correspond to *Hyla multifasciata*, a species that Cochran considered a synonym of *albopunctata*.

Miranda-Ribeiro's (1926) description of *Hyla boans* Daud. corresponds to that of *H. albopunctata*; however, the illustration accompanying the description corresponds to *H. raniceps*. In addition, Miranda-Ribeiro (1926) cited Brasil and Guyanas as the geographic distribution for the species; this suggests that he probably was working with a mixture of specimens corresponding to *albopunctata*, *raniceps*, and *multifasciata*. The same mistake was made by Nieden (1923) when citing *albopunctata* for Brasil and the Guianas.

Rivero (1961) considered this species as *H. albopunctata* because he treated another species of the group, *H. multifasciata*, as a subspecies of *albopunctata*. However, these two species consistently show distinct color patterns, different mating calls, and disjunct geographic distributions. These differences warrant recognition of the two forms at the specific level.

Lescure (1986) claimed that no difference in mating calls existed between those of *H. albopunctata* from southern Brazil and of *H. multifasciata* from Guyana. Consequently, based solely on calls, without explaining morphological and biogeographical differences, he incorrectly suggested that these two names formed a single species. However, he presented no analysis of calls to support his conclusion. De Sá (1986) found the calls of these two species to be consistently distinctive.

Beçak (1968) reported the karyotype of *H. albopunctata* as $2N = 22$. Bogart (1973) pointed to the specialized nature of this chromosome number and suggested that it evolved from an ancestor with $2N = 24$ through chromosomal reduction.

Frank and Ramus (1995) proposed the use of the common name, Spotted Treefrog.

• **Etymology.** The specific name is an adjective derived from the Latin *albus* (= white) and *punctata* (= dotted), in reference to the white dots scattered over the flanks and posterior surface of the thighs in these frogs.

• **Comment.** Two characters, head longer than wider and lack of outer metatarsal tubercles, have been traditionally used to cluster *Hyla albopunctata*, *H. lanciformis*, *H. multifasciata*, and *H. raniceps* in the *albopunctata* species group. However, de Sá (1986) pointed out that these characteristics are shared with other *Hyla* species groups and do not provide evidence that the *albopunctata* group is monophyletic.

Literature Cited

- Andersson, L.G. 1900. Catalogue of Linnean type-specimens of Linnaeus's Reptilia in the Royal Museum in Stockholm. Bih. Svenska Vet.-Akad. Handl., 26, 4:1-29.
- Baumann, F. 1912. Brasilianische Batrachier des Berner naturhistorischen Museums nebst Untersuchungen über die geographische Verbreitung der Batrachier in Brasilien. Zool. Jahrb. 33:87-172.
- Beçak, M.L. 1968. Chromosome analysis of eighteen species of Anura. Caryologia 21:191-208.
- Beebe, W. 1919. Higher vertebrates of British Guiana, with special reference to the fauna of Bartica District. Zoologica (N.Y.) 2:205-227.
- . 1925. Studies of a tropical jungle; one quarter of a square mile of jungle at Kartabo, British Guiana. Zoologica (N.Y.) 6:5-139.
- Bogart, J.P. 1973. Evolution of anuran karyotypes, p. 337-349. In Vial, J.L. (ed.), Evolutionary biology of the anurans: contemporary research on major problems. Univ. Missouri Press, Columbia.
- Boulenger, G.A. 1882. Catalogue of the Batrachia Salientia s. Ecaudata in the collection of the British Museum. Trustees (British Museum), London.
- Burnmeister, C.H.C. 1856. Erläuterungen zur Fauna Brasiliens, enthaltend Abbildungen und ausführliche Beschreibungen neuer Orden ungenügend bekannter Thier-Arten. Georg Reimer Verlag, Berlin.
- Carvalho, A.L. de. 1939. Observações e lista dos batráquios. Inst. Oswaldo Cruz Bol. Biol., new ser. 4:279-280.
- Cei, J.M. 1980. Amphibians of Argentina. Monitore Zool. Ital. (N.S.) Monogr. (2):1-609.
- Cochran, D.M. 1955. Frogs of southeastern Brasil. Bull. U.S. Natl. Mus. 206: xiv + 423 p.
- Cope, E.D. 1862. Catalogues of the reptiles obtained during the exploration of the Parana, Paraguay, Vermejo and Uruguay rivers, by Capt. Thos. J. Page, U.S.N.; and of those procured by Lieut. N. Michler, U.S. Top. Eng., commander of the expedition conducting the survey of the Attrato river. Proc. Acad. Nat. Sci. Philadelphia 14:346-359.
- . 1863. On *Trachycephalus*, *Scaphiopus*, and other Batrachia. Proc. Acad. Nat. Sci. Philadelphia 15:43-54.
- . 1867. On the families of the raniform Anura. J. Acad. Nat. Sci. Philadelphia, ser. 2, 6:189-206.
- Crawford, S.C. 1931. Field keys to lizards and amphibians of British Guiana. Ann. Carnegie Mus. 21:11-42.
- and E.P. Jones. 1933. Field notes on some amphibians from British Guiana. Copeia 1933:88-92.
- Daudin, F.-M. 1800. Histoire naturelle des quadrupèdes ovipares. 1er et 2e liv. Fuchs et Delalain, Paris.
- . 1802. Histoire naturelle des rainettes, des grenouilles et des crapauds. Levrault edit., Paris.
- . 1803a. Histoire naturelle des rainettes, des grenouilles et des crapauds. Levrault edit., Paris.
- . 1803b. Histoire naturelle des reptiles. Dufart, Paris.
- de Sá, R.O. 1986. Review of the South American *Hyla albopunctata* group. M.S. Thesis, Univ. Kansas, Lawrence.
- Duellman, W.E. 1971. The nomenclatural status of the names *Hyla boans* (Linnaeus) and *Hyla maxima* (Laurenti) (Anura: Hylidae). Herpetologica 27:397-405.
- . 1976 (1977). Liste der rezenten Amphibien und Reptilien: Hylidae, Centrolenidae, Pseudidae. Das Tierreich 95:1-225. Walter de Gruyter & Co., Berlin and Leipzig.
- Duméril, A.M.C. and G. Bibron. 1841. Erpétologie générale, ou histoire naturelle complète des reptiles. Vol. 8. Libr. Encyclopédique Roret, Paris.
- Frank, N. and E. Ramus. 1995. A complete guide to scientific and common names of reptiles and amphibians of the world. NG Publ., Inc., Pottsville, Pennsylvania.
- Günther, A.C.L.G. 1858. Catalogue of the Batrachia Salientia in the collection of the British Museum. Trustees of the British Museum, London.
- Heyer, W.R., A.S. Rand, C.A. Gonçalves da Cruz, O.L. Peixoto, and C.E. Nelson. 1990. Frogs of Boracéia. Mus. Zool. Univ. São Paulo, Arq. Zool. 31(4):1-410.
- Latreille, P.A. 1801. In C.S. Sonnini and P.A. Latreille, Histoire naturelle des reptiles. Vol. 2. Déterville, Paris.

- Laurenti, J.N. 1768. Specimen medicum, exhibens synopsin reptilium emendatum cum experimentis circa venena et antidota reptilium Austriacorum, quod autoritate et consensu. J. Thomæ Trattner, Viennae.
- Lescure, J. 1976. Contribution a l'étude des Amphibiens de Guyane française. VI. Liste préliminaire des Anoures. Bull. Mus. Nat. Hist. Nat. ser. 3 (377)(zool. 265):475-528.
- . 1986. Amphibiens et reptiles de la bande cotiere en Guyane Française. Le Littoral Guyanais 1986:111-118.
- Linnaeus, C. 1754. Museum Siae Riae Mitis Adolphi Friderici regis Suecorum. In quo animalia rariora, inprima & exotica: Aves, Amphibia, Pisces describuntur. P. Momma, Holmi.
- . 1758. Systema naturae per regna tria naturae secundum classes, ordines, genera, species cum characteribus differentiis, synonymis, locis. Tomus I. Ed. decima, reformata. L. Salvii, Holmiae (=Stockholm).
- Lutz, B. 1973. Brazilian species of *Hyla*. Univ. Texas Press, Austin and London.
- Lynch, J.D. 1979. The amphibians of the lowland tropical forests, p. 189-215. In W.E. Duellman (ed.), The South American herpetofauna: its origin, evolution, and dispersal. Monogr. Univ. Kansas Mus. Nat. Hist. (7).
- Mertens, R. 1940. Nochmals über den Namen "*Hyla boans*." Zool. Anz. 132:195.
- Miranda-Ribeiro, A. de. 1926. Notas para servirem ao estudo dos Gymnobatrachios (Anura) brasileiros. Arch. Mus. Nac. Rio de Janeiro 27:1-227.
- Nieden, F. 1923. Das Tierreich. Anura I. Subordo Aglossa und Phaneroglossa. Section 1, Arcifera. Walter de Gruyter & Co., Berlin and Leipzig.
- Parker, H.W. 1928. Notes on reptiles and batrachians from Matto Grosso and E. Bolivia. Ann. Mag. Nat. Hist. ser. 10, 2:96-99.
- . 1935. The frogs, lizards, and snakes of British Guiana. Proc. Zool. Soc. London 3:505-530.
- Peracca, M.G. 1904. Viaggio del Dr. A. Borelli nel Matto Grosso brasiliano e nel Paraguay, 1899. Bol. Mus. Torino 19(460): 1-15.
- Peters, W.C.H. 1872. Über die von Spix in Brasilien gesammelten Batrachier des Königl. Naturalienkabinetts zu München. Monatsb. Königl. Akad. Wiss. Berlin 18:196-227.
- Reinhardt, J.T. and C.F. Lütken. 1861 (1862). Bidrag til kundskab om brasiliens padder og krubdyr. Videns. Meddel. Dansk Naturh. foren. Kjøbenhavn 3(10-15): 143-242.
- Rivero, J.A. 1961. Salientia of Venezuela. Bull. Mus. Comp. Zool. 126:1-208.
- Ruthven, A.G. 1919. The amphibians of the the University of Michigan-Walker Expedition to British Guiana. Occ. Pap. Mus. Zool., Univ. Michigan 69:1-14.
- Schubart, P.A. 1939. Fauna do estado de Pernambuco e dos estados limítrofes. Segunda lista. Bol. Mus. Nac. Rio de Janeiro, new ser., zool., 14-17:51-58.
- Shreve, B. 1935. On a new teiid and Amphibia from Panama, Ecuador, and Paraguay. Occ. Pap. Boston Soc. Nat. Hist. 8:209-218.
- Spix, J.B. de. 1824. Animalia nova sive species novae testudinum et ranarum quas itinere per Brasiliam annis MDCCCXVII-MDCCCXX jussu eT auspiciis Maximiliani Josephi I. Bavariae Regis. S. Hübschmanni, Monachii.
- Travassos L. and J.F.T. Freitas. 1942. Relatório da sexta excursão do Instituto Oswaldo Cruz realizada à zona da Estrada de Ferro Noroeste do Brasil em Novembro de 1941. Mem. Inst. Oswaldo Cruz 31:282-284.
- Tschudi, J.J. 1838. Classification der Batrachier, mit Berücksichtigung der fossilen Thiere dieser Abtheilung der Reptilien. Mém. Soc. Sci. Nat., Neuchâtel.
- Wagler, J.G. 1830. Natürliches System der Amphibien mit vorangehender Classification der Säugethiere und Vögel. Ein Beitrag zur vergleichender Zoologie. J.G. Cotta, München, Stuttgart, und Tübingen.

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